

John William Birks Curriculum Vitae

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Date of Birth: December 10, 1946

Education: B.S., University of Arkansas, High Honors, 1968
M.S., University of California, Berkeley, 1970
Ph.D., University of California, Berkeley, 1974

Ph.D. Thesis: "Theory of the Dissociation of Diatomic Molecules and a Study of the Emission Spectra of IF," Principal Advisor: Professor Harold S. Johnston

Positions Held:

President, 2B Technologies, Inc., Boulder, CO, 2005-
Vice President for Research and Development, 2B Technologies, Inc., Golden, CO, 2002-2005
Executive Vice President, InDevR, Inc., Boulder, CO, 2002-
Professor Emeritus, 2002-; Professor, 1984-2002; Chair, 1995-8; Associate Professor, 1977-84;
Department of Chemistry and Biochemistry, University of Colorado, Boulder, CO
Fellow Emeritus, 2002-; Fellow, 1977-2002; Acting Director, 7/82-8/82, 8/83, 6/84-7/84, 5/85-6/86;
Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado,
Boulder, CO
Affiliated Professor, Program in Atmospheric and Oceanic Sciences (PAOS), University of Colorado,
Boulder, CO, 1992-2002
Affiliated Professor, Environmental Studies Program, University of Colorado, Boulder, CO, 1999-2001
Visiting Scientist, National Center for Atmospheric Research, Boulder, Colorado, 5/93-8/94
Guest Scientist, Department of Analytical Chemistry, Free University, Amsterdam, The Netherlands,
5/82-6/82, 7/83, 6/84, 6/87
Guest Scientist, Max Planck Institute for Chemistry, Gutenberg University, Mainz, Germany, 8/81-5/82
Assistant Professor, Department of Chemistry, University of Illinois at Urbana-Champaign, 1974-77

Awards:

Alfred P. Sloan Fellowship, 1979-81
Faculty Fellowships, University of Colorado Council on Research and Creative Work, 1981/82, 1986/87
and 1993/94 Academic Years
Leo Szilard Award for Physics in the Public Interest, American Physical Society, 1985
John Simon Guggenheim Fellowship, 1986
Witherspoon Peace and Justice Award, 1986
Thomas Jefferson Award, University of Colorado, 1989
Colorado Section Award, American Chemical Society, 1990
Teaching Fellowship, University of Colorado Council on Teaching, 1990
Hazel Barnes Prize (Highest CU faculty award), 2000
ACS Award for Creative Advances in Environmental Science and Technology, American Chemical
Society, 2003

Distinguished Lectures:

Ralph M. Johnson Distinguished Guest Lecture, College of Science, Utah State University, 1986
 William J. Probst Memorial Lecture, School of Science, Southern Illinois University at Edwardsville, 1987
 Featured Lecture, American Society for Mass Spectrometry, 35th Conference on Mass Spectrometry and Allied Topics, Denver, Colorado, 1987
 Frontiers of Science Lecture, University of Florida, Gainesville, Florida, 1988
 Council on Teaching Lecture, University of Colorado, Boulder, 1991
 Douglas G. Hill Memorial Lecture, Duke University, Durham, North Carolina, 1998

Total Number of Talks at Scientific Meetings, Seminars and Public Lectures: 291

Membership in Honorary and Professional Organizations:

American Association for the Advancement of Science
 American Chemical Society
 American Geophysical Union
 Alpha Chi Sigma (Professional, Chemistry)
 Phi Beta Kappa (Honorary, Arts and Sciences)
 Pi Mu Epsilon (Honorary, Mathematics)
 Sigma Xi (Scientific Research Society)

Undergraduate Courses Taught: General Chemistry II, Instrumental Analysis, Environmental Chemistry I, Environmental Chemistry II

Graduate Courses Taught: Analytical Spectroscopy, Analytical Electrochemistry, Chromatography and Analytical Separations, Atmospheric Chemistry

Advisory Committees, Consultantships and Public Service

Science Advisor, Denver Regional Laboratory, U.S. Food and Drug Administration	1980-82
Sierra Club, Committee on War and the Environment, Charter Member	1982-90
Science Advisory Board, Conference on The Long-Term Worldwide Biological Consequences of Nuclear War	1983
Committee on the Atmospheric Effects of Nuclear Explosions, National Research Council	1983-84
Drafting Committee, "National Research Plan for Nuclear Winter," National Climate Program Office, NOAA, Report to the Office of Science, Technology and Policy	1984
Proposal Review Panel, Exploratory Research Program, Environmental Protection Agency	1984-1992
Science Advisory Board, Sievers Research, Inc.	1984-1998
Hewlett-Packard, Analytical Chemistry Workshops, Instructor	1985-91
Scientific Programs Evaluation Committee, National Center for Atmospheric Research	1985
Symposium on Chemiluminescence and Photochemical Reaction Detection in Chromatography, organizer and host, Alanspark, Colorado, May 15-18, 1986	1986
Colloquium on the Chemistry of the Lower and Middle Atmosphere, National Center for Atmospheric Research, co-organizer and co-instructor with Susan Solomon, July 7-25, 1986	1986
University Corporation for Atmospheric Research, University of Colorado Representative	1987-88
Atmospheric Chemistry Workshop, sponsored by NASA Upper Atmosphere Theory and Data Analysis Program, Keystone Resort, Colorado, co-instructor with Susan Solomon and John Pyle, July 25-31, 1987	1987
Symposium on Chemiluminescence, 29th Rocky Mountain Conference, Denver, Colorado, organizer and chair	1987

Symposium on "Hidden Dangers: The Environmental Consequences of Preparing for War," CU, Boulder, CO, organizer and host	1988
Chair, Future Actions Committee, CHEMRAWN (CHEMical Research, Applied to World Needs) VII, "The Chemistry of the Atmosphere: Its Impact on Global Change," International Union of Pure and Applied Chemistry, Baltimore, Maryland, December 2-6, 1991	1989-92
External Review Committee, Department of Chemistry and Biochemistry University of Maryland, College Park, Maryland	1991
External Review Committee, Physical Sciences Graduate Program, University of California, Irvine, California	1992
Consultant to NCAR on the Commercial Aircraft Sensing Humidity (CASH) Project	1992-94
Symposium on Atmospheric Chemistry, Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, Georgia, organizer and chair	1993
Session on Atmospheric Chemistry, Symposium on Environmental Chemistry, American Chemical Society National Meeting, Denver, Colorado, organizer and chair	1993
Advisory Committee and External Review, Atmospheric Chemistry Division, National Center for Atmospheric Research	1993
Awards Selection Committee, American Chemical Society	1993-96
Proposal Review Panels, Small Business Innovative Research (SBIR) Program, National Science Foundation	1993-94
Proposal Review Panel, Global Change Program, National Oceanic and Atmospheric Administration	1993
Series Editor, <i>Topics in Environmental Chemistry</i> , Oxford University Press	1993-99
Symposium on Environmental Analytical Chemistry, Federation of Analytical Chemistry and Chemical Spectroscopy Societies (FACSS) Meeting, Providence, Rhode Island, organizer and session chair	1997
Co-Founder, 2B Technologies, Inc., Golden, CO	1998
Co-Founder, InDevR, LLC, Boulder, CO	2002

Ph.D. Theses Directed

1. Thomas, J. Leck, 1979, "A Determination of the Rate Constant and Products for the Reaction of the Chlorine Oxide Radical with the Hydroperoxyl Radical"
2. Brian Shoemaker, 1981, "Singlet-Delta Molecular Oxygen as a Tool for Selective Chemiluminescent Detection in Chromatography"
3. Richard A. Borders, 1981, "A Direct Determination of the Activation Energy for the Reaction of Nitric Oxide with Ozone"
4. Richard D. Stratton, 1981, "Development of a Vacuum Ultraviolet Atomic Emission Detector for Chlorine"
5. John W. Vanderzanden, 1981, "Chemiluminescence in the Reactions of Cl with ClOCl, OClO and O₃"
6. Mitchell S. Gandelman, 1983, "Photochemical Reaction Detectors for High-Performance Liquid Chromatography"
7. Kenneth W. Sigvardson, 1984, "Peroxyoxalate Chemiluminescence Detection in Liquid Chromatography"
8. Julie K. Nelson, 1984, "Fluorine-Induced Chemiluminescence Detection of Reduced Sulfur Compounds in Gas Chromatography"
9. Andrew P. Ongstad, 1985, "A Study of Two Reactions Important in Stratospheric Chemistry: $O + NO_2 \rightarrow NO + O_2$ and $O + ClO \rightarrow Cl + O_2$ "
10. Christine A. Ennis, 1985, "Studies of the Generation and Reactions of Gaseous HOCl"
11. Elizabeth A. Mishalanie, 1985, "Fluorine-Induced Chemiluminescence Detection of Organosulfur Compounds in Microbore High Performance Liquid Chromatography and a Study of the Ultraviolet Absorption Spectrum of Gaseous Hypochlorous Acid"
12. Alan J. Hills, 1987, "Kinetics Investigations of Atmospheric Reactions"
13. Curtis L. Shellum, 1988, "Chromatographic Detection Based on Singlet Oxygen Photochemistry"
14. James R. Poulsen, 1988, "Photochemical and Chemiluminescent Reaction Detection of Quinones in HPLC"
15. Kathy L. Rowlen, 1989, "Whole Column Detection Chromatography"
16. Andrew A. Turnipseed, 1990, "Kinetics of the Reactions of BrO Radicals with ClO and BrO, and the Chemiluminescent Reactions of Fluorine with Dimethyl Sulfide"
17. Thomas G. Chasteen, 1990, "Fluorine-Induced Chemiluminescence Detection of Biologically Methylated Tellurium, Selenium, and Sulfur Compounds and Methyl-dithiocarbonylhydrazide as a Formaldehyde Derivatization Reagent"
18. Robert E. Milofsky, 1991, "Kinetics, Mechanism and Analytical Applications of Photoinitiated Peroxyoxalate Chemiluminescence"
19. Garrett N. Brown, 1991, "Photocatalysis and Photoelectrochemical Detection at Semiconducting Titanium Dioxide"
20. Sherry L. Stephens, 1992, "Ozone as a Sink for Atmospheric Carbon Aerosols"
21. Kevin L. Kelly, 1992, "Theory and Application of Preparative-Scale Whole Column Detection Chromatography"

22. Daniel R. Rodier, 1993, "Measurement of Tropospheric Aldehydes and Ketones by Derivatization with Dansyl Hydrazine and 2,4-Dinitrophenyl Hydrazine"
23. Paul T. Buckley, 1993, "Photochemistry of Atmospheric Ozone Cluster Molecules and Bromoform Emission from Arctic Ice Algae"
24. David O. De Haan, 1994, "Heterogeneous Reactions of Chlorine Peroxide on Ice Surfaces Doped with Halide Ions: Reaction Kinetics and Atmospheric Significance"
25. Priscilla L. Burrow, 1995, "Determination of the Mechanism of the Sulfur Chemiluminescence Detector"
26. Andrew G. Hadd, 1995, "Kinetics and Mechanism of the Imidazole-Catalyzed Peroxyoxalate Chemiluminescence Reaction"
27. Karl G. Knapp, 1996, "Vertical Profiling of Ozone and Meteorological Parameters in the Lower Atmosphere Using Kite and Balloon Platforms"
28. David W. Lehmpuhl, 1997, "Development of a New Derivatization Method for the Determination of Airborne Aldehydes and Ketones Using Gas Chromatography and the Analysis of Atmospheric Aerosols Using Atomic Force Microscopy"
29. John A. Bogner, 1998, "Development and Application of Lightweight Instruments for Vertical Profiling of Ozone and Carbon Monoxide"
30. Rhonda L. Skaggs, 1998, "Development of a Microcartridge Technique for the Measurement of Carbonyl Compounds and Emissions from Plants and a New Technique for the Measurement of Argon as a Passive Tracer"
31. Jill K. Robinson, 1999, "Luminol-Hydrogen Peroxide Chemiluminescence Detector for the Analysis of Nitric Oxide in Exhaled Breath"
32. Laura R. Kuck, 1999, "Measurement of Carbon Dioxide Fluxes in the Amazon Basin and the Design, Development and Testing of Two New Carbon Dioxide Detectors"
33. Amy E. Michel, 2001, "Atomic Force Microscopy Studies of Carbonaceous Materials and their Reactivity"
34. Christine M. Karbiwnyk, 2001, "Use of CFCs as Internal Standards for Measurements of Non-Methane VOCs Sampled onto Solid Adsorbent Cartridges"
35. James E. Boulter, 2002, "Development of a 'Low-Pressure Counterflow Exchanging Virtual Impactor' for Aerosol Analysis and Measurement of Ozone Mixing Ratios and Meteorological Parameters Through the Boundary Layer at Summit, Greenland"
36. Bryan P. Wert, 2002, "Development, Validation, and Application of a High Performance Tunable Diode Laser Absorption Spectrometer for Airborne Formaldehyde Measurements"
37. Kristen Schulz, 2003, "Measurements of Landscape-Scale Fluxes of Carbon Dioxide at Two AmeriFlux Sites Using a New Vertical Profiling Technique"
38. Brian Lerner, 2003, "Implications of Metal Carbonyl/Ozone Chemiluminescence upon Stratospheric Measurements of Oxides of Nitrogen"
39. Kevin L. Wilson, 2005, "Water Vapor Interference in the UV Absorption Measurement of Ozone"

M.S. Students Directed

1. Elizabeth A. Hill, 1981, Thesis: "The Detection of Ozone-Induced Chemiluminescence from Analytes in the Solid State"
2. Jac-E L. Cook, 1981, Thesis: "The Temperature Dependent Rate Constant and Stratospheric Implications of the Reaction $\text{Cl} + \text{HOCl} \rightarrow \text{Products}$ "
3. Jenifer E. Tavernier, 1987, Thesis: "Fluorine-Induced Chemiluminescence Detection of Organosulfur Compounds in Capillary Gas Chromatography"
4. Kelley M. Wells, 1990, Thesis: "Development of an Element Selective Detector for Gas Chromatography"
5. Maxim Khaytsus, 1992, Thesis: "Computer Simulation Model of Preparative Scale Whole Column Detection Chromatography"
6. Joseph P. Smith, 1992, Thesis: "Ground Based Measurements of Atmospheric NO_3 at Middle and Polar Latitudes During Sunrise and a Method of Determining the NO_3 Altitude Distribution," with Susan Solomon
7. Chris Cantzler, 1997, Research Paper: "Nitric Oxide Detection by Luminol Chemiluminescence"
8. Erika Watson, 1998, Research Paper: "Chemiluminescence in the Reaction of Sulfur Vapor with Ozone"
9. William R. Eberle, 2002, Thesis: "Microcalorimetric Measurement of Water Vapor Based on the Reaction of $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$ "

Postdoctoral Students Mentored

1. Robert J. Glinski (Ph.D., University of Minnesota), 1984/85
2. William T. Foreman (Ph.D., University of North Carolina), 1988/89
3. William Scott (Ph.D., University of California, Berkeley), 1993/94
4. Andreas Grömping (Ph.D., University of Münster, Germany), 1994/95
5. Tyrrell Smith (Ph.D., University of California, Irvine), 1995/96
6. Anke Seeber, (Ph.D., University of Münster, Germany), 1995/96
7. Marta Lores (Ph.D., Spain) 1996
8. Detlev Helmig (Ph.D., University of Duisburg, Germany), 1996-2000

Senior Visiting Scientists Hosted

1. John Kennish, University of Alaska, 1984
2. Gerald Gübitz, University of Graz, Austria, 1988/89
3. Lubos Nondek, Water Research Institute, Prague, Czechoslovakia, 1991/92
4. Oleg Zoui, Fulbright Fellow, Academy of Sciences, Kiev, Ukraine, 1994/95, 2000/01
5. David Griffith, University of Wollongong, Australia, 1997

Contracts and Grants

Sponsor	Title	Period	Amount
ACS/PRF	Chemistry of Chlorine In the Stratosphere	5/75-8/78	\$9,000
MCA 75-1	Measurement of Reaction Rates Relevant to the Fluorocarbon/Ozone Problem	5/75-8/76	\$35,000
MCA 76-117A&B	Studies of Homogeneous and Heterogeneous Reactions of Importance in the Stratosphere	8/76-8/77	\$61,756
Research Corporation Cottrell Research Grant	Direct Measurement of Activation Energies	6/77-6/78	\$8,000
NIH Biomedical Sciences Support Grant	Effect of Chlorine on Stratospheric Ozone	9/77-9/78	\$10,000
MCA 77-192	Studies of Homogeneous and Heterogeneous Reactions of Importance in the Stratosphere	9/77-9/78	\$95,500
MCA 77-222	Development of a Technique for Measuring the Total Chlorine Content of Air, Joint with C.J. Howard and F.C. Fehsenfeld of the NOAA Aeronomy Laboratory	2/78-2/79	\$40,000
NCAR	Trajectory Study of the Dissociation of Hydrogen	2/78-2/79	\$10,000
MCA, 78-244	Studies of Reactions of Importance in the Stratosphere	9/78-9/79	\$60,000
NSF, Instructional Scientific Equipment Program	Interdisciplinary Teaching Laboratory for Instrumental Analysis, Joint with John A. Thompson of the School of Pharmacy	9/78-1/81	\$52,600
A.P. Sloan Foundation	Alfred P. Sloan Fellowship	9/79-9/81	\$20,000
NSF, Chemistry CHE-79-15801	A Chemiluminescence Detector for Gas Chromatography	8/79-8/82	\$159,660

Contracts and Grants (Cont.)

Sponsor	Title	Period	Amount
CMA, 79-276	Studies of Reactions of Importance in the Stratosphere	9/79-9/80	\$80,000
CMA, 80-321	Studies of Reactions of Importance in the Stratosphere	9/80-9/81	\$30,000
CMA, 80-329	Kinetics Studies of Reactions of OH and HO ₂ by Negative Chemical Ionization Mass Spectrometry	11/80-11/81	\$45,000
CMA, 81-358	Studies of Reactions of Importance in the Stratosphere	12/81-12/82	\$35,000
CMA, 82-425	Studies of Reactions of Importance in the Stratosphere	1/83-1/84	\$65,000
NATO, 0259/83	Photochemical Reaction Detection in Continuous Flow Systems, Joint with R.W. Frei of the Free University, Amsterdam	3/83-3/84	\$10,000
CMA, 83-490	Continued Studies of Stratospheric Species and Reactions	1/84-1/85	\$55,457
EPA, Exploratory Research Program R-810717	Chemiluminescence and Photochemical Reaction Detection in GC and HPLC	11/83-11/86	\$249,404
Kratos Instruments	Photochemical Reaction Detector for HPLC	6/85-9/85	\$2,500
NASA, Upper Atmosphere Program, 1721-UA-455	Temperature Dependence of the Rate Constant and Product Channels for the BrO + ClO Reaction	9/85-9/86	\$48,073
John Simon Guggenheim Memorial Foundation	Guggenheim Fellowship	6/86-6/87	\$23,000
Hewlett-Packard	Workshop on Analytical Chemistry	6/87	\$34,738

Contracts and Grants (Cont.)

Sponsor	Title	Period	Amount
Sievers Research	Investigation of New Detection Principles for Chromatography	6/87-6/88	\$25,000
EPA, Exploratory Research Program R-813912	Photoacoustic Spectroscopy for Whole Column Detection Chromatography, P.I. with James P. Avery (Co-P.I.)	9/87-9/89	\$198,222
John D. and Catherine T. MacArthur Foundation	Environmental Impacts of Nuclear Weapons and Military Activities, Joint with Anne H. Ehrlich of Stanford University	4/88-10/89	\$70,000
Sievers Research	Whole Column Detection Chromatography	5/89-10/89	\$10,000
NSF, Atmospheric Sciences Program, ATM-89-13231	Contributions to Atmospheric Chemistry by Photochemical Reactions of Cluster Molecules, P.I. with Veronica Vaida (Co-P.I.)	11/89-11/92	\$355,000
DOE, National Institute for Global Environmental Change	Effects of Environmental Factors on Phytoplankton Emissions of Dimethyl Sulfide: Implications for Climate Change	7/91-7/92	\$51,780
NOAA, Global Change Program, GP-91-135 NA26GP0079	Tropospheric Measurements of Aldehydes and Ketones by Derivatization and Chemiluminescence Detection	1/92-1/94	\$105,015
NSF, Education Division	"Graduate Training Program in Atmospheric Chemistry"; with Veronica Vaida	9/93-9/98	\$550,000
NCAR	Visiting Scientist Support	5/93-8/94	\$10,000
NOAA, Global Change Program, GP-93-309 NA36GP0255	Diurnal and Seasonal Variations of Aldehydes and Ketones in a Boreal Forest Atmosphere	7/93-7/95	\$123,500
Camille and Henry Dreyfus Foundation SG-94-115	"CHEMRAWN Global Monitoring Proposal: A Novel Approach to Global Atmospheric Monitoring: The Use of High-Flying Kites"; Co-P.I. with Ben Balsley (P.I.), Pieter Tans and Rudy Pariser	12/94-12/96	\$48,932

Contracts and Grants (Cont.)

Sponsor	Title	Period	Amount
NSF/SGER ATM-941761	"Demonstration of Quasi-Continuous Vertical Profiling of Ozone Throughout the Troposphere Using High-Technology Kites"; Co-P.I. with Ben Balsley (P.I.)	3/94-3/95	\$45,513
EPA, Exploratory Research Program R82-1252-010	Development of New Techniques for Atmospheric Profiling of Hydrocarbon Oxidation Products Using Kites as "Sky Hooks"	10/94-10/97	\$370,000
NOAA, Global Change Program, GP-95-427 NA56GP0238	"Development of Small, Light-Weight, Low-Power Instruments for Atmospheric Field Measurements"	5/95-5/98	\$271,526
IUPAC/CHEMRAWN	"Fluxes of Greenhouse Gases in the Amazon Basin of Peru" P.I. with Ben Balsley (Co-P.I.)	6/96-6/97	\$18,300
EPA, Air Quality Program R825417-02	"Measurements of Non-Methane Volatile Organic Compounds in the Lower Troposphere from Tethered Balloon and Kite Sampling Platforms by Internal Standard Calibration Using Ambient CFC Reference Compounds" Co-P.I. with Detlev Helmig (P.I.)	10/96-10/99	\$436,172
NOAA, Global Change Program, NA86GP0529	"Development of New Instrumentation for Vertical Profiling of the Atmosphere"	8/98-8/99	\$27,526
DOE/NIGEC	"Profiling CO ₂ and Water Vapor Through the Boundary Layer and Lower Troposphere in Support of the AmeriFlux Program" P.I. with Ben Balsley (Co-P.I.)	7/99-7/02	\$425,000
ADA Technologies	"Automated Airborne Measurement of Ozone," subcontract on Phase II DOC/SBIR grant (\$500k total)	1/00-1/01	\$35,241
NSF/SGER	"Vertical Profiling of Ozone within the Planetary Boundary Layer at Summit/Greenland" Co-P.I. with Detlev Helmig (P.I.) and Donald David (Co-P.I.)	1/00-1/01	\$49,972
NSF/ATM	"Sesquiterpene Emissions from Vegetation: Chemical Analysis Technique for Estimating Ambient Concentrations and Contributions to Ozone and Aerosol Formation" Co-P.I. with Detlev Helmig (P.I.)	5/00-5/03	\$390,161
DOE SBIR Phase I (2B Technologies)	"Ultrasonic Detector for Carbon Dioxide"	7/02-3/03	\$100,000
DOE SBIR Phase II	"Ultrasonic Detector for Carbon Dioxide"	7/03-1/06	\$750,000

(2B Technologies)

NIH/SBIR Phase I (2B Technologies)	"Nitric Oxide Detector for Asthma Diagnosis and Treatment"	2/06-8/06	\$80,455
CDC/SBIR Phase I (2B Technologies)	"Rapid Iodine Analyzer"	9/06-3/07	\$99,982
CDC/SBIR Phase II (2B Technologies)	"Rapid Iodine Analyzer"	9/08-9/10	\$700,000
NIH/NIEHS SBIR Phase I (2B Technologies)	"Personal Ozone Monitor"	9/08-3/09	\$100,000